https://doi.org/10.3301/ABSGI.2024.02

Bari, 2-5 September 2024

ABSTRACT BOOK

a cura della Società Geologica Italiana

BARI 2024

Geology for a sustainable management of our Planet

S32.

Geosciences at school 2024

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An experimental approach to improving the teaching-learning process in the geosciences

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Keywords: geosciences literacy, inquiry-based learning, instructional model.

How can the teaching-learning process in the field of Geosciences be made more effective? Geosciences are difficult disciplines, because of their complexity and articulation, and this makes the teaching – learning process challenging. In order to implement an effective didactic approach teachers should have a solid geological background that allows them to structure effective activities characterised by inductive approach, innovation and engagement. Furthemore, most teachers don't dedicate the right amount of time to the Geosciences, and the deductive approach to teaching scientific disciplines is widely used. In order to overcome these difficulties we have designed an instructional model based on the literature data (Hoffman & Ritchie, 1998; Bybee, 2014; Ambrose et al., 2017) on how we learn, that can be used with different inductive methodologies and for all type of topics. The model has been applied in the framework of the PLS/PNRR project in two different high schools in Sicily and has been proposed to the Lyceum students from the third to the fifth year. In this context the pathway aims to guide students towards discovery by investigating the causes, evidences and effects of Climate Change. As detectives, the students collect "clues" through real data, observations, tools and use investigative techniques that allow them to piece together the current complex climatic process in its general aspects. The objectives are to develop knowledge, skills and competences in the Geosciences and the way Geoscientists study the Earth. This is important to acquire Geosciences Literacy and to educate citizens who make conscientious and sustainable decisions for our planet. The path consists of four activities building on inquiry-based learning, each addressing an aspect of the Global Climate Change. For each activity a different methodology which place the student at the centre of the didactic action in order to promote the construction of learning has been used. Each activity is included in the instructional model that is developed in 3 phases: preparation, construction and evaluation. In order to explain this framework, we will present one of the four activities, according to the DGBL methodology, regarding the main cause of Global Climate Change. The students are guided step by step in the learning process, and they are given a "Pre-Test", a "Post-Test" and a metacognition survey. The Pre-Post Tests are designed to evaluated the success of the activity and its effectiveness in developing the Geosciences Literacy, while the metacognition questionnaire is structured to assess the students' satisfaction with the activity and to make them aware of their cognitive path, and preconceptions and misconceptions. The data obtained shows that there has been an improvement in skills and knowledge acquisition. Furthemore, an improvement of competences development in Geosciences Literacy and consciousness of what it means to be a Geoscientist has been recorded.

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